

TML

SUNSTAR传感与控制 <http://www.sensor-ic.com/> TEL:0755-83376549 FAX:0755-83376182 E-MAIL:szss20@163.com

TML Pam E-442B

SMART DYNAMIC STRAIN RECORDER

Standard

DC-204R

With analog output

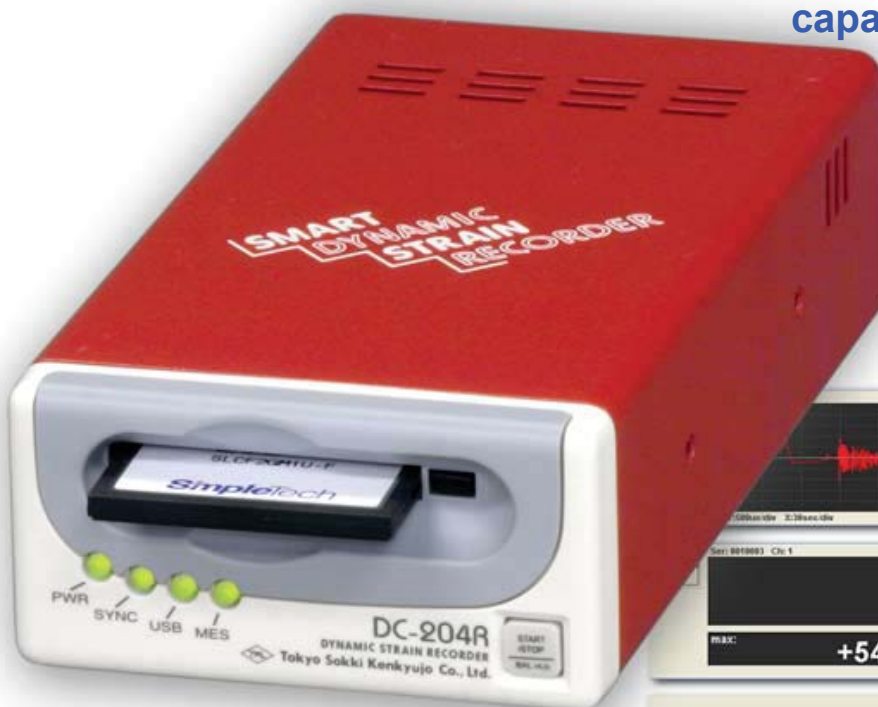
DC-204Ra

Strain
DC voltage
Temperature

High speed
sampling
200kHz

Large data
recording
2GB
capacity

Automatic data
storing at power
interruption
**onboard
UPS**



Tokyo Sokki Kenkyujo Co., Ltd.

SUNSTAR自动化 <http://www.sensor-ic.com/> TEL: 0755-83376489 FAX:0755-83376182 E-MAIL:szss20@163.com

200kHz sampling! Large data storing with 2GB CF card! All-in-one model with further upgraded functions!



The DC-204R/DC-204Ra is a compact flash recording type 4-channel dynamic strain recorder and measures strain, DC voltage and thermocouples. The DC-204Ra equips an analog output of $\pm 5V$ to enable, waveform output to external recorders, display devices and automobile ECU. As compared with the previous model DC-104R/DC-104Ra, the frequency response is upgraded to 10kHz and sampling speed to 200kHz at the fastest. At the same time of measurement, measured data are automatically stored on a compact flash card up to 2GB. Using the controller DC-7204 as bundled software, the maximum 8 units (32 channels) including the DC-104 series can be used together. In addition to numerical monitor and waveform display, dynamically variable amount can be displayed in analog form and in real time. The battery-operating all-in-one model is optimum for measurement on a high speed moving body. AC operation needs a power adaptor as an option.

The recorder is compatible with a compact flash card adapter of 32MB to 2GB. The formatted flash cards are available from TML.

Miniature

- Possible connection of 8 units (total 32 channels)

It is as small as 15.7x8.4cm like postcard and 4.2cm in height, suitable for vehicle onboard measurement. The 4-channel unit can be connected in parallel up to 8 units (total 32 channels).

Onboard Analog Output DC-204Ra

Using the supplied analog output cable (CR-3610), the DC-204Ra can output 4-channel live waveform to external recorders and display devices.

Automatic Data Protection at Power Interruption (UPS)

New Function

In case of accidental power degradation during measurement, the built-in UPS circuit stops measurement and gets measured data automatically and safely stored on the CF card. Even if power supply is suddenly interrupted, the power switch is designed to turn off after recording the measured data on the CF card.

Memory Card of 2GB at the Maximum

Upgraded

It is compatible with a flash memory card of 32MB to 2GB in memory capacity. The formatted CF cards are available from TML. TML does not guarantee operation of commercial CF cards.



Recording Format

Measured data can be stored in not only CSV format but BIN format conforming to commercial software DADiSP for data analysis of dynamic phenomena. The bundled software CONTROLLER DC-7204 can get the data stored in CSV and BIN format.

High speed Sampling of 200kHz

Upgraded

The DC-204 series has a frequency response of DC to 10kHz. The maximum sampling speed is 200kHz with one channel. Reading of the stored data from the CF card during measurement and monitoring the measuring waveform data in real time are possible. (N.B. The sampling speed is restricted.)

Bar Graph Monitor and Circular Graph Monitor

New Function

The DC-204 series bundled software CONTROLLER DC-7204 can monitor dynamically variable amount in analog form and in real time with bar graph and circular graph as well as numeric values and waveform.



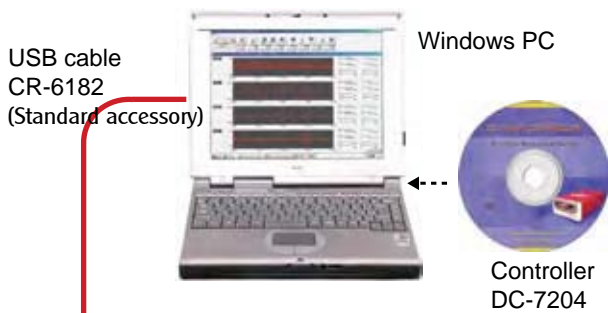
DADiSP is available as a separate software package from DSP Development Corporation in the USA.

Sampling Speed and Recording Time

The highest sampling speed is 5 μ sec.* with one channel and the measured data are recorded on a specified CF memory card at the same speed. The relationship of recording time (measuring time) with sampling speed is tabulated below. The measuring time depends on the data size.

* 1 channel use

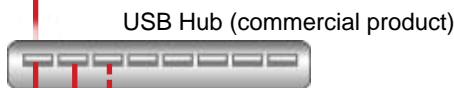
| Sampling frequency | Sampling speed | 1 channel | 2 channels | 4 channels |
|--------------------|----------------|------------|------------|------------|
| 200kHz | 5 μ s | 1.3 hours | — | — |
| 100kHz | 10 μ s | 2.7 hours | 1.3 hours | — |
| 50kHz | 20 μ s | 5.5 hours | 2.7 hours | 1.3 hours |
| 10kHz | 100 μ s | 27.4 hours | 13.5 hours | 6.7 hours |
| 5kHz | 200 μ s | 55.4 hours | 27.4 hours | 13.5 hours |
| 1kHz | 1ms | 11.4 days | 5.6 days | 67.5 hours |
| 500Hz | 2ms | 23.1 days | 11.4 days | 5.6 days |
| 50Hz | 20ms | 231 days | 114 days | 56.3 days |
| 20Hz | 50ms | 572 days | 281 days | 140 days |
| 10Hz | 100ms | 1155 days | 572 days | 281 days |



Measurement with 1 unit



Measurement with 2 or more units



Synchronous cable CR-6181 (Option)



Possible connection up to 8 units of DC-104 or DC-204 series (Mixing available)

Analog output

DC-204Ra (DC-104Ra)

Analog output to external devices

Analog output cable CR-3610

Recorders

Oscillographs

Digital display devices

Automobile ECU, etc.



Measurement Software

Controller DC-7204 (Standard accessory)

Main menu

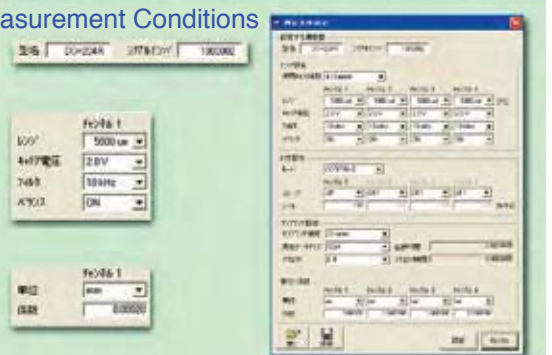
Main menu at the time of start



Setting up Measurement Conditions



Click the Measure Setting to open dialog for measurement conditions.



Set measuring capacity, unit, coefficient etc.

Monitoring



Click the Monitoring Setting. Dynamically variable amount during measurement can be viewed in numeric, waveform, bar-graph, circular-graph, etc.



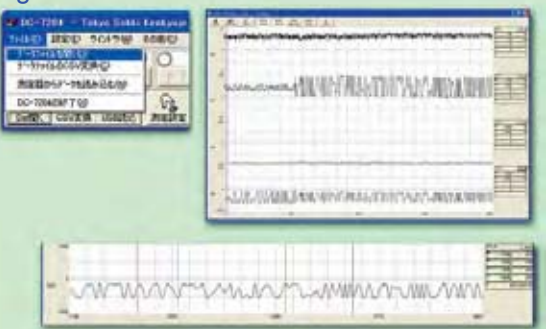
Circular-graph monitor

Bar-graph monitor

Measured data are written directly on CF card. Data format is BIN or CSV.

Data Processing

The measured data saved on CF card are read. Processing such as printout, display of maximum, minimum and mean values and cutout is done.



Related Products

Measurement Software *Visual LOG*

DC-7630 Dynamic strain recorder measurement and Data Processing Software

In addition to operation extended channel function, on-line or off-line automatic measurement can be made. An function of extracting /omitting measured data is provided. Graphic display in real time during sampling is possible.



DFA-7610 FFT Analysis and Processing Software

Various analysis processing for data file gotten by the supplied software DC-7204 or optional software DC-7630 is done.

Carring Case CA-10A



This is an aluminum carrying case to store the recorder, strain connectors, cables, etc.

Size: 400(W) x 260(D) x 100(H) mm

Input channel Section

Strain gauges



Strain Connectors **OPTION**



A strain gauge bridge configuration connector for the DC-104/DC-204 series recorders

- SB-120DD-1R 120 ohms 3-wire quarter bridge
120/350 ohms half bridge
- SB-350DD-1R 350 ohms 3-wire quarter bridge
120/350 ohms half bridge
- SB-120DD-4R 120/350 ohms full bridge

Available is a remote sense cable (Option) to compensate for sensitivity degradation due to cable extension.

Strain gauge based transducers



Sensor input conversion cable CR-6180 (Standard accessory)



Used for connecting strain gauge based transducers (for force, displacement, pressure, acceleration, etc.) with a NDIS plug at the cable.

DC voltage



Attenuation cable CR-4010 **OPTION**



Used when inputting voltage signal. The measuring range of voltage signal is $\pm 20V$. The signal is attenuated to 1/1000 for input.

Thermocouple (temperature)



Thermocouple adapter TA-01KT **OPTION**

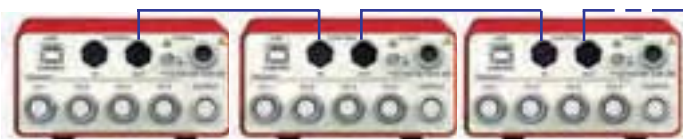


It enables temperature measurements using thermocouples type T or K. No external power supplies is needed. The adapter is connected through the supplied sensor input conversion cable CR-6180.

Control Section **Max. 32 channels with 8 units**

In case of connecting 2 or more units of the DC-104R/DC-204R series, the use of the synchronous cable CR-6181 (option) makes simultaneous sampling possible. In this case, power supply is necessary for all the connected recorders.

Synchronous cable CR-6181



External Start/Stop and External Trigger

External control signals for start, stop and trigger are input to the OONTROL IN connector.

Power Supply Section

DC Power Supply DC10~16V

The supplied cable CR-1310 is used.

Battery driving

Battery driving in combination with the battery pack BA-104 (option) is possible.



AC Power Supply

Using the AC adapter set CR-1860 (option), AC operation is possible.

USB Interface Section

Using the supplied USB cable CR-6182, the DC-104R/DC-204R recorders can be hooked up to a computer.



Analog Output Section **[DC-204Ra/DC-104Ra]**



By connecting the supplied output cable CR-3610 to the OUTPUT connector, a voltage output of 0 ~ 5V is obtained. Voltage signals for 4 channels from the one connector cable can be output to external recorders, etc.

Compact flash memory card

TML specified CF card is used. The memory capacity is up to 2GB.

Status LED

Each operational status is indicated.
MES /Measuring
USB /Communicating with USB cable
SYNC /Synchronizing with 2 or more recorders.
PWR /Switching on

START/STOP

Gets started or stopped.

BAL/HLD

By depressing the key 3 seconds or more, Balancing functions for the model itself.



USB Interface

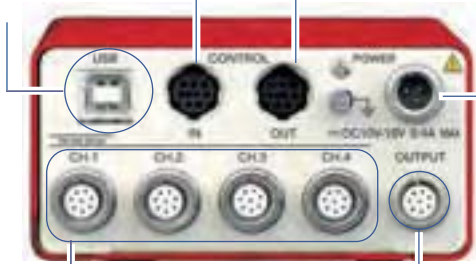
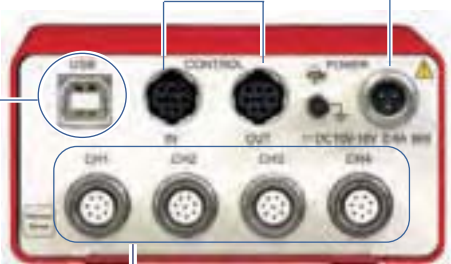
The USB cable (CR-6182) is plugged in. Measurement setup and data are transferred to a PC.

Power supply

Operates on DC power supply. The battery and recorder are connected with the power cable (CR-1310). For AC operation, use the optional AC adapter set CR-1860.

Control

For synchronization of 2 or more recorders. The optional synchronous cable (CR-6181) is needed.



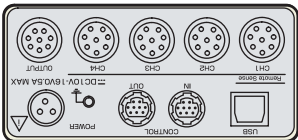
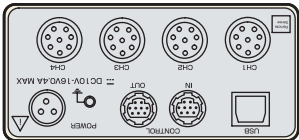
Power supply

Input channel

Strain gauges and strain gauge based transducers are plugged in through the supplied sensor input conversion cable (CR-6180). The voltage input attenuation cable CR-4010 (option) and thermocouple adapter TA-01KT (option) can be also connected.

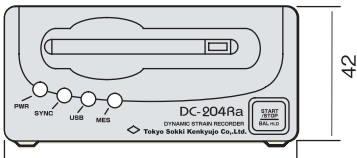
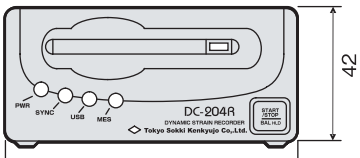
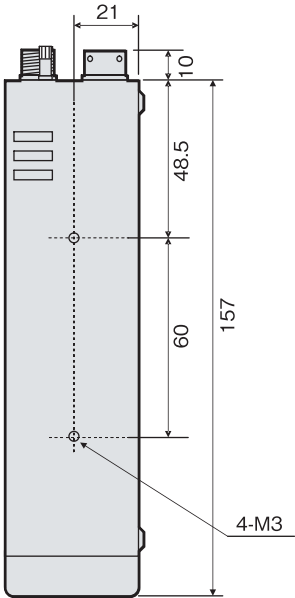
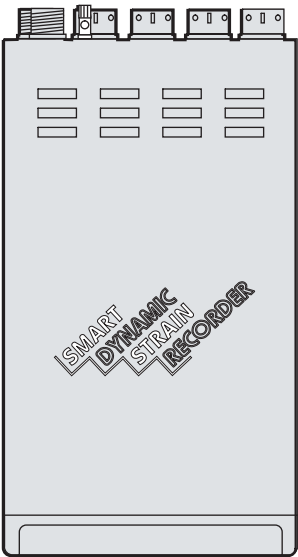
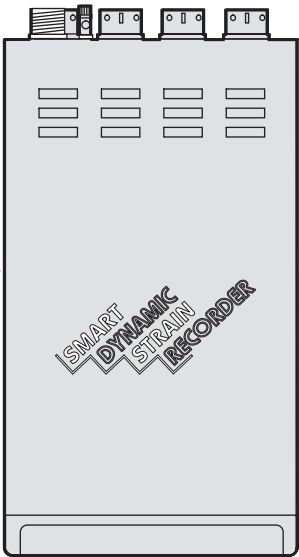
Analog output [DC-204Ra only]

The DC-204Ra has an analog output. By connecting the supplied analog output cable (CR-3610), a live wave form is output to an external recording device.



DC-204R

DC-204Ra



Unit in mm

Measurement

| | |
|---|--|
| Measuring points | 4 |
| Inputs | Strain DC voltage with optional cable CR-4010 |
| Strain measurement | |
| Gauge resistance | 120Ω、350Ω (Full bridge) |
| Bridge excitation | DC2V、0.5V、ON/OFF control |
| Measuring range | 1000、2000、5000、10000、20000×10 ⁻⁶ strain in 5 ranges |
| Maximum range | ±80000×10 ⁻⁶ strain |
| Accuracy | ±0.2%FS |
| Voltage measurement [using CR-4010 option] | |
| Measuring range | 1、2、5、10、20V in 5 ranges |
| Maximum range | ±20V |
| Accuracy | ±0.3%FS |
| Lowpass filter | 10、30、100、300Hz、1k、3k、10kHz (Bessel type) |
| Frequency response | DC ~ 10kHz (-3dB±1dB) |
| Temperature coefficient | |
| Stability on zero | ±1×10 ⁻⁶ strain/°C with maximum sensitivity |
| Stability on span | ±0.01%FS/°C with maximum sensitivity |
| Balancing method | Electronics |
| Balancing range | ±10000×10 ⁻⁶ strain |
| Balancing accuracy | ±0.06%FS |
| Balancing speed | Approx. 1 sec. per channel |
| A/D converter | 16-bit successive approximation |
| Resolution | 1000×10 ⁻⁶ strain range : 1 or 0.1×10 ⁻⁶ strain 2000×10 ⁻⁶ strain range : 1 or 0.1×10 ⁻⁶ strain 5000×10 ⁻⁶ strain range : 1×10 ⁻⁶ strain 10000×10 ⁻⁶ strain range : 1×10 ⁻⁶ strain 20000×10 ⁻⁶ strain range : 1×10 ⁻⁶ strain |
| Sampling method | Simultaneous sampling |
| Sampling speed | 5μs in 1 channel mode (200kHz) 10μs in 2 channel mode (100kHz) 20μs in 4 channel mode (50kHz) |

Function

| | |
|-------------------------|--|
| Start/Stop | Panel key operation, External signal Computer operation available |
| Manual trigger | External signal, Computer operation available |
| Balance/Open check | Panel key operation, Computer operation available |
| Synchronous measurement | Synchronous sampling available with 8 units 32 channels Combination use with DC-104R/DC-104Ra available |

Display unit

| | |
|------------|--|
| LED status | Power, Synchronization, USB, Measurement |
|------------|--|

Setup

| | |
|---------------|--|
| Procedure | By USB communication with bundled software |
| Channel | 1、2、4 channel mode |
| Trigger | |
| Trigger mode | SINGLE、CONTINUE、FREERUN |
| Trigger level | ±(0% ~ 100%) with 0.1% division for full scale |

Data save

| | |
|----------------------|--|
| Saving media | Compact FLASH memory card 32M~2GB supplied from TML N.B.: High speed sampling use card is 128M~2GB supplied from TML. |
| Format | Conforms to DADiSP/2000 |
| Saving speed | 5μs ¹ 、10μs ² 、20μs、50μs、100μs、200μs、500μs、1ms、2ms、5ms、10ms、20ms、50ms、100ms、200ms、500ms、1s 1 : in 1-ch use only 2 : in 1-、or 2-ch use only Other with up to 4 channels |
| (Sampling intervals) | |
| Data size | 1k、2k、4k、8k、16k、32k、64k、128k、256k、512k、1M、2M、3M、4M、6M、8M、12M、16M、24M、32M、48M、60M、120M ³ 、240M ⁴ [Data] 3 : in 1-ch use only 4 : in 1-、or 2-ch use only Other with up to 4 channels For high speed sampling, the size is restricted to 64k data over in 1-ch use, 32k data over in 2-ch use, and 16k data over in 4-ch use. |
| Pre-area | Changeable by 10% division for 0~100% while 256k data in 1-ch is at maximum. |
| File numbers | Maximum 255 |

Analog output [DC-204Ra only available]

| | |
|---------------------------|---|
| Voltage output | ±5V (5kΩ load) or ±1mA |
| Output accuracy | ±0.3%FS |
| Output balancing accuracy | ±5mV or less (at 5000×10 ⁻⁶ strain) |
| Stability on zero | ±2mV/°C (at maximum sensitivity) |
| Calibration output | ±1V |
| Lowpass filter | 10、30、100、300Hz、1k、3k、10kHz (amplitude flat) |
| S/N ratio | 46dBp-p or over (with filter of 1kHz or less, 1000×10 ⁻⁶ strain) |

General Specifications

| | |
|---------------------|--|
| Power supply | 10 ~ 16V dc DC-204R 0.4A MAX. DC-204Ra 0.4A MAX. |
| Environment | 0°C ~ +50°C 85%RH or less (no condensation) |
| Vibration tolerance | 49m/s ² (5 ~ 50Hz) in 3 directions |
| Dimensions | 84 (W) ×42 (H) ×157 (D) mm |
| Weight | 500g |

■ Product for CE marking is available on request.

Standard accessory

| | |
|--|---|
| Operation manual | 1 |
| DC Power cable CR-1310..... | 1 |
| Sensor cable CR-6180 | 4 |
| USB cable CR-6182 | 1 |
| Output cable CR-3610 【DC-204Ra only】 | 1 |
| Compact Flash Memory card | |
| High speed type (512MB) | 1 |
| Measuring software Controller DC-7204 (CD-ROM) | 1 |

Specifications are subject to change without prior notice.



Approval Certificate ISO9001
Design and manufacture of
strain gauges, strain measuring
equipment and transducers



Tokyo Sokki Kenkyujo Co., Ltd.
www.tml.jp/e

8-2, Minami-Ohi 6-Chome, Shinagawa-Ku, TOKYO 140-8560, JAPAN

TEL: Tokyo 03-3763-5611 FAX: Tokyo 03-3763-5713

e-mail address: sales@tml.jp